tire gastrointestinal tract to be later reconstructed in stages. This procedure was designed to decrease the mortality rate associated with pancreaticoduodenectomy when it is required in severely traumatized patients.

EARL F. WOLFMAN, JR., MD

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Intraoperative Autologous Autotransfusion

REINFUSION OF AUTOLOGOUS BLOOD to provide a readily available, hepatitis-free intraoperative blood source has been proposed as a solution to critical shortages of banked blood. Three techniques have been used successfully: (1) preoperative self-donation with storage by red cell freezing or citrate phosphate dextrose anticoagulation, (2) early intraoperative phlebotomy and crytalloid volume replacement with readministration of the stored fresh blood at the end of the procedure and (3) intraoperative autotransfusion. All of these techniques have been used during elective operations, but only the third lends itself readily to an emergency situation.

The concept of transfusing blood salvaged during surgical procedures by means of an extracorporeal system was first recorded in 1818. Within the past ten years laboratory and clinical reports have been published and sterile, disposable autotransfusion systems have become readily available commercially. Animal studies of autotransfusion have used flows up to 1,000 ml per minute to volumes twice the total blood volume of the subject. Clinical reports include autotransfusion volumes up to 18 liters.

In an emergency situation the available equipment can be prepared in ten minutes to prevent uncrossmatched blood from being used in treating massive intracavitary hemorrhage. Total heparinization, 1.5 to 3 mg per kilogram of body weight, to prevent *in vitro* coagulation is recommended by several authors, even in massive trauma. Others have used incremental hemodilution and heparinization of only the aspirated blood or no anticoagulation at all. The system is primed with a solution similar to that used in cardiopulmonary bypass. Acidosis due to ischemia of major vessel clamping or low volume hypotension is combatted with bicarbonate. To assist in adequate urine formation in the face of reduced renal perfusion or traumatic hemolysis, hyperosmolar diuresis is achieved with mannitol.

As with many new techniques purported to solve existing problems, new hazards are introduced. Most of the problems associated with autotransfusion, such as air embolus, are within the control of a trained operator. Those who would use this system but are unfamiliar with extracorporeal circulation should familiarize themselves with the available literature which elucidates the fundamental problems of autotransfusion systems and the manner in which they can be safely applied.

DELFIN J. BELTRAN, MD

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Tissue Transplantation with Microvascular Surgery

MICROVASCULAR ANASTOMOSIS of blood vessels 0.6 mm to 2.0 mm in diameter is a new surgical technique with a success rate of over 90 percent in experimental models. This technique can now be applied to clinical reconstructive surgery. The two applications are digit reimplantation and skin island pedicle transplantation. Digits can be reimplanted or transplanted following traumatic amputations, for congenital absence of digits or when digits have been amputated for neoplasm or metabolic diseases. The success rates for digit reimplantation as reported by surgeons in China, Japan, Australia and the United States vary from 50 to 84 percent. There are specific indications and contraindications to digit reimplantation.

Large islands of skin and subcutaneous tissue which have been isolated on an arterial-venous pedicle can be transplanted by microvascular anastomosis. The anatomic sites for donor skin pedicles (autologous transplantation) have been delineated and successful transplant of skin flaps has been achieved. At present, there are limited applications for this technique and it has not supplanted existing methods of flap transfer. Only